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IN THIS ISSUE: *Don Ollis*

*M. Woodbridge Williams & Karl W. Kenyon • William P. Dasmann*

*Graham Heid • Robert Cunningham Miller*

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## In This Issue

*Calico Cactus Blooms*—*Echinocereus engelmanni* has short, cylindrical stems clothed with yellowish to brownish spines, the varicolored effect giving it the name "calico cactus." The delicately brilliant magenta flowers are three to four inches across. This species is common in the lower Colorado River basin, in California, Arizona, and Sonora.

Photograph by DON OLLIS . . . . . Cover

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## Pre-Discovery

"Mule Deer Meadow could as well have been the one which John Muir described as the 'Jewel of the Sierra.' . . . There are hundreds, perhaps thousands, of other meadows like it . . . completely surrounded by thick, dark forests of lodgepole pine and red fir." The warblers, sparrows, vireos, the insects "represent the day shift of the animals that work the meadow and are familiar to all who frequent meadows in the Sierra Nevada of California. Who takes over on a night in June after the last liquid notes of the Sierra hermit thrush are committed to memory? . . .

"It was early in September when we were in Mule Deer Meadow with cameras and flash bulbs. Hardly had the baits been spread in front of the cameras before the first nocturnal creatures began to appear from the black wall of fir foliage." Lloyd Glenn Ingles, who recorded the doings of the "Night Shift in a Sierra Meadow" for our next issue, is professor of zoölogy in Fresno State College and director, this summer, of the Audubon Camp of California. His skill as animal photographer and knowledge of animal ways are well illustrated in his book, *Mammals of California*.

## Discovering PD's Authors

Getting under way here, we recalled William Beebe's *Zaca Venture*. M. Woodbridge ("Woody") Williams and Karl W. Kenyon, dropping the *Seven Seas* hook in Cedros Island anchorage, had had a distinguished recent predecessor and an historic early one. It was Beebe who recalled Ulloa, out of Hakluyt. Curiously, General Francisco de Ulloa's chronicler was a "Francis" Preciado—ancestor, could it be, of Carlos Preciado, leader of "The Turtle Hunters of Scammon Lagoon"? Beebe's chart of the 1936 *Zaca* voyage shows Cedros to be pivotal on the Baja California coast, a natural turning point for the *Seven Seas*, also out of San Diego, ten years later. Four centuries earlier the Spaniard, out of Acapulco, logged (Hakluyt's version, Rasmusio's account of Ulloa's 1539 expedition, Beebe quoting): ". . . We sailed with scarce and contrary winds, and at length came to the cape of the point of the Iland, which

we called Isla de los Cedros or the Ile of Cedars, because that on the tops of the mountaines therein, there grows a wood of these Cedars being very tall, as the nature of them is to be." To wrap it up, Beebe placed overleaf from his chart Toshio Asaeda's lovely photograph of these same "cedar"-topped "mountaines" taken "exactly 144,600 sunsets" after Francisco Preciado. Not forgetting Carlos Preciado and his turtles: Woody and Karl write of hunters—for a wonderful chapter on turtles, go to Clarion Island with Beebe at the close of *Zaca Venture*. Then read his *Book of Bays* if you want to pick up adventurous coasting from where the *Seven Seas* turned homeward at Cedros, southeast all the way to Panama and Colombia.

On December 30, 1949, the Western Society of Naturalists in its 19th annual winter meeting, at Stanford University, held a "Symposium on the Conservation of Natural Resources." William P. Dasmann, game range technician in the California Division of Fish and Game, dealt with the mother-resource, the land, if we may use "range" broadly. The question, "Can We Hold the Western Range?" not only asks whether we will maintain production of livestock, but is bound up with water supply, forests, recreation, wildlife—the manifold dependencies of soil.

On the National Park Service-sponsored Rainbow Bridge-Monument Valley Expedition of 1933 we had a colleague, Graham Heid—photographer, botanist, entomologist, fellow-enthusiast for the Southwest. After these many years he turned up again, by mail, with "The Cacti—American Family," and we add writer, and "cactologist," to his characteristics. Then one day last year he came up to Berkeley for advanced courses and over to the Academy as preparator of insects. He has since returned to Los Angeles, vector control work, and—we hope—the cacti.

A few readers will perhaps be moved by Robert Cunningham Miller's "Oldest Bird Nest?" to curiosity about the acorn-storing California woodpecker and its propensity for putting acorns, or pebbles, into little holes, with or without the possibility of future recovery. There is a book for them: William Emerson Ritter's philosophical *The California Woodpecker and I*. D.G.K.

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A JOURNAL OF NATURE AND MAN IN THE PACIFIC WORLD

## Night Saving Time

A COUPLE OF YEARS AGO we gained the distinct and unhappy impression that our summer climate had undergone a change for the worse. We found ourselves shivering on July and August mornings, and toying with the idea of lighting the furnace before brewing the matutinal pot of coffee. We gave thought to all the possible reasons for this state of affairs—sun spots, a slow recurrence of the glacial period, or the not wholly implausible theory that advancing age was chilling the marrow of our bones. All at once the real explanation occurred to us. By reason of that modern iniquity known as daylight saving time, we were getting up and struggling about at an hour when nature intended us to be still in bed. The climate was as good as ever once the sun was up and had a chance to do its stuff; but we were fighting a hitherto unnoticed fog and chill because somebody had been monkeying with the clock.

Be it said right here to all and sundry, we are opposed to legislating in the face of nature. Certain phenomena have been arranged without any effort on our part, among them being gravity and time. Clocks are—or at least were from Greek and Roman days until comparatively recently—devices for recording the movements of sun or stars; and there still are some people, astronomers, for instance, and navigators, who hold to the quaint idea that time has some kind of basis in the natural order. But if we are going to proceed on the assumption that a clock is just a gadget with hands that you turn forward or back at will, let us earnestly consider which way we want to turn them. Why daylight saving? Why not night saving? Let's turn the clock back instead of forward. The advantages are obvious.

First of all, when you get up in the morning the sun is there to greet you, bright, warm, friendly, cheerful, relaxed—his early morning chores, such as dispelling fogs and miasmas, already done. True, you will not see the dew sparkling on the grass; but on the credit side you can walk across the lawn in your bedroom slippers and retrieve the morning paper from under the lilac bush, where the boy always throws it, without getting your feet wet.

All in all, the advantages of early rising have been vastly overrated. We arrived at this conclusion while young in years, and speak from a conviction born of milking the cows, cleaning the stables and harnessing the horses before breakfast, so as to get on with the haying. Nowadays we are willing to let to any young and energetic poet the

concession of conveying our crepuscular greetings to Phoebus and Aurora.

As a matter of fact, the poets themselves have been somewhat luke-warm in this department. A few hardy souls like Robert Browning (*Morning's at seven; The hillside's dew-pearled*) and Edwin Markham (*Oft when the white still dawn Lifted the skies and pushed the hills apart*) have either been up before breakfast or have fondly tried to imagine what it might be like.\* But for every poet who has memorialized the dawn, we can give you at least two or three who have written feelingly of the night. For a starter, here is Robert Southey:

How beautiful is night!  
A dewey freshness fills the silent air;  
No mist obscures; nor cloud, nor speck, nor stain,  
Breaks the serene of heaven:  
In full-orbed glory, yonder moon divine  
Rolls through the dark blue depths;  
Beneath her steady ray  
The desert circle spreads  
Like the round ocean, girdled with the sky.  
How beautiful is night!

Next we offer Shelley, who seems to have enjoyed the luxury of a white wool rug in his bedroom:

That orb'd maiden with white fire laden  
Whom mortals call the moon,  
Glides glimmering o'er my fleece-like floor,  
By midnight breezes strewn.

And just to show that American poets have not spent all their time getting up with the milkman, we quote Thomas Buchanan Read:

O Night! most beautiful and rare!  
Thou givest the heavens their holiest hue,  
And through the azure fields of air  
Brings't down the gentle dew.

Finally we give you Shakespeare, that universal genius who understood all human faults and foibles, and clearly anticipated daylight saving well over three centuries ago:

Methought I heard a voice cry, "Sleep no more!  
Macbeth does murder sleep!" the innocent sleep,  
Sleep that knits up the ravell'd sleeve of care.

\*Thomas Hood (1798-1845) deserves some kind of immortality for the following:

She stood breast-high amid the corn  
Clasped by the golden light of morn,  
Like the sweetheart of the sun . . . . .

Thus she stood amid the stooks,  
Praising God with sweetest looks.



It is one of our folk-ways, so long established as to be an American tradition, to stay up late on Saturday night and then sleep in on Sunday morning. Even our parents, imbued with the Puritan tradition, gave themselves an extra forty winks. Think what night saving time would mean in this connection. Everybody in the country would go to bed an hour later, and get up an hour later. Every night a Saturday night and every morning a Sunday morning! The idea is stupendous. It would make men healthier, happier, kinder to their wives, and might even usher in a new era of international goodwill.

And think what it would mean to have that extra hour of darkness in the evening. More time to spend in the family circle, making taffy or bobbing for apples or watching wrestling on television. More time to enjoy the mellowness of summer moonlight, more time for romance, more time for fairies to dance upon the lawn, one more hour of grace for Cinderella before her golden carriage turns back into a pumpkin.

Then there are the little children to consider. How they hate to go to bed—anytime, for that matter, but most of all on summer evenings. How poignantly comes from childish lips the rhyme:

In winter I get up at night  
And dress by yellow candle light.  
In summer quite the other way,  
I have to go to bed by day.

With night saving time, no little one will have to toddle off to bed before dark, much less endure the soul-searing experience of getting up before daybreak. Childhood will indeed become the happy time it is commonly but erroneously represented.

Speaking of children leads us to think of their nature, nurture, education and culture. Night saving time will never, we feel deeply confident, encourage or even tolerate the conversion of a singular adjective into a plural noun. Daylight saving time, on the other hand, has spawned a curious colloquialism, *daylight savings*—as if those golden moments subtracted from one end of the day in a will-o'-the-wisp hope of enjoying them at the other, could be accumulated like money in the bank. Even a transcontinental railroad, noted for its attention to the niceties of cultured living, has shown its fine contempt for daylight saving time and/or the English language by announcing in its current schedule of trains:

All times shown in this folder are Standard Time—not Daylight Savings. Add one hour to figure the equivalent in Daylight Savings Time where applicable.

We are familiar in a philosophical sense with Parmenidian time, Heraclitian time, Newtonian time, Leibnitzian time, Hegelian time, Bergsonian time, and space-time. Scientifically we have had to deal with sidereal time, apparent time, mean solar time, standard time and the equation of time. But we confess that daylight saving time has us baffled. When it comes to the practical problem of catching trains and planes, we have reverted to the infantile practice of counting on our fingers and have discovered the following alternatives: we can be (a) on time, (b) one hour early, (c) one hour late. There are doubtless further possible permutations in passing from one time belt to another, or as in New York City where, in the same depot, you can find some trains leaving on standard and others on daylight saving time.

With night saving time, on the other hand, you could never make a serious mistake. In catching a train or plane leaving on standard time, if you figured correctly you would be there on the dot; if you made a mistake you would merely be an hour early, with plenty of time to find your tickets, check your baggage, and buy a new toothbrush to replace the one you forgot to bring. But wait a minute! If you made an error in converting from night saving time to standard time, would you be an hour early, or two hours late? Oh, let's skip it and stay home.

But do not be dismayed. Being at home can take on the aspect of a continuous vacation. The legislation we are promoting will specifically exempt alarm clocks, which will remain on standard time. So at the end of a hard day you crawl in between the sheets at eleven o'clock night saving time (being midnight standard time), sigh contentedly and drift off to happy dreams. At 6:00 A.M., when your alarm clock, not knowing anything about night saving time, goes off in the pale gray dawn with obscene clangor, you reach out, grasp it firmly in the right hand, and throw it forcefully through the open window. Then, as it crashes against the brick wall next door and tinkles musically down on the concrete driveway below, you turn over on that good old innerspring mattress, snuggle down among the covers and pound the pillow for sixty blissful minutes more, to be awakened at last, in due and proper time, by sunbeams dancing on the counterpane.

Daylight saving, indeed! What this world needs is shorter days and longer, more restful nights.

R.C.M.

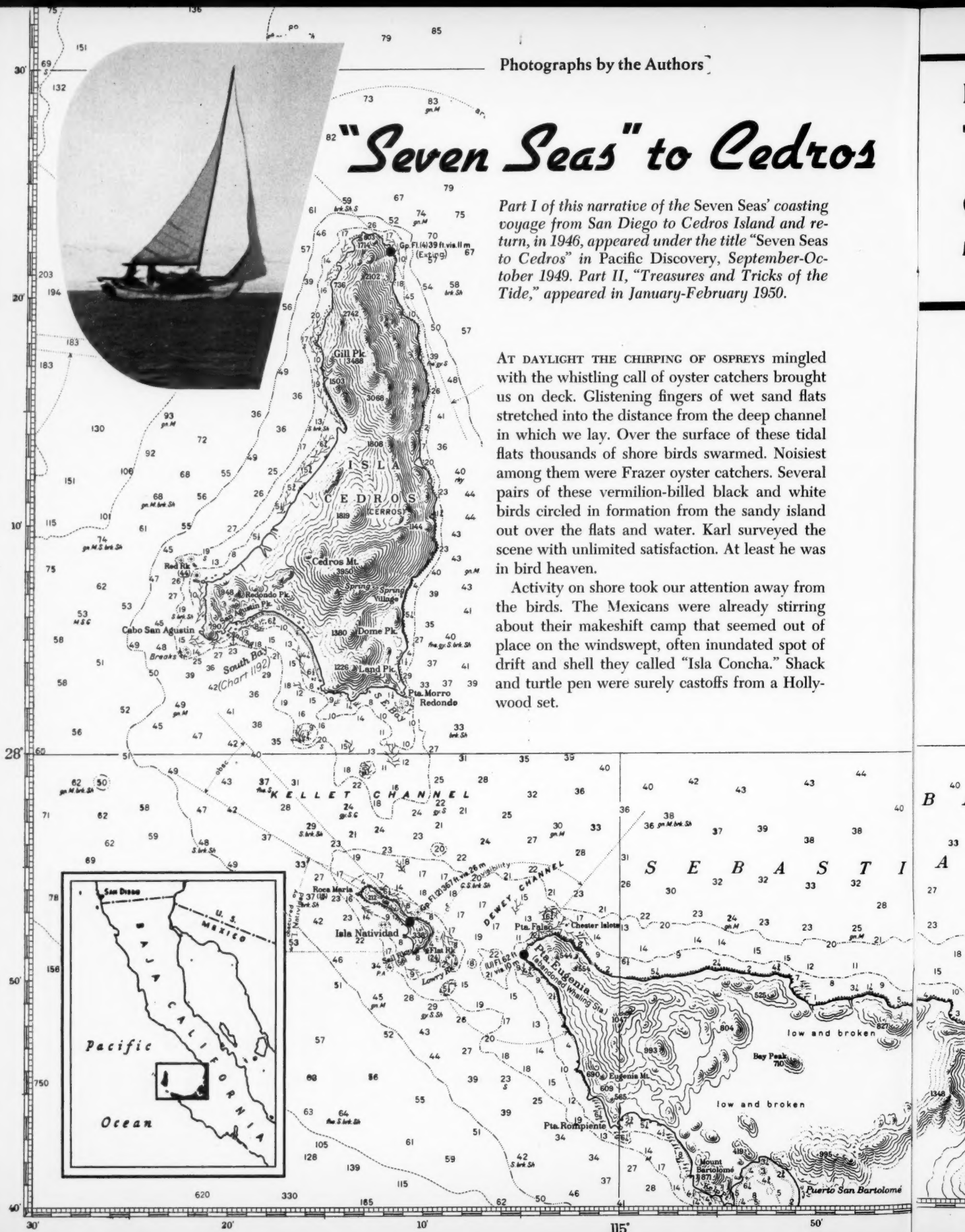
Photographs by the Authors

# "Seven Seas" to Cedros

Part I of this narrative of the Seven Seas' coasting voyage from San Diego to Cedros Island and return, in 1946, appeared under the title "Seven Seas to Cedros" in *Pacific Discovery*, September-October 1949. Part II, "Treasures and Tricks of the Tide," appeared in January-February 1950.

AT DAYLIGHT THE CHIRPING OF OSPREYS mingled with the whistling call of oyster catchers brought us on deck. Glistening fingers of wet sand flats stretched into the distance from the deep channel in which we lay. Over the surface of these tidal flats thousands of shore birds swarmed. Noisiest among them were Frazer oyster catchers. Several pairs of these vermilion-billed black and white birds circled in formation from the sandy island out over the flats and water. Karl surveyed the scene with unlimited satisfaction. At least he was in bird heaven.

Activity on shore took our attention away from the birds. The Mexicans were already stirring about their makeshift camp that seemed out of place on the windswept, often inundated spot of drift and shell they called "Isla Concha." Shack and turtle pen were surely castoffs from a Hollywood set.



### Part III: Conclusion

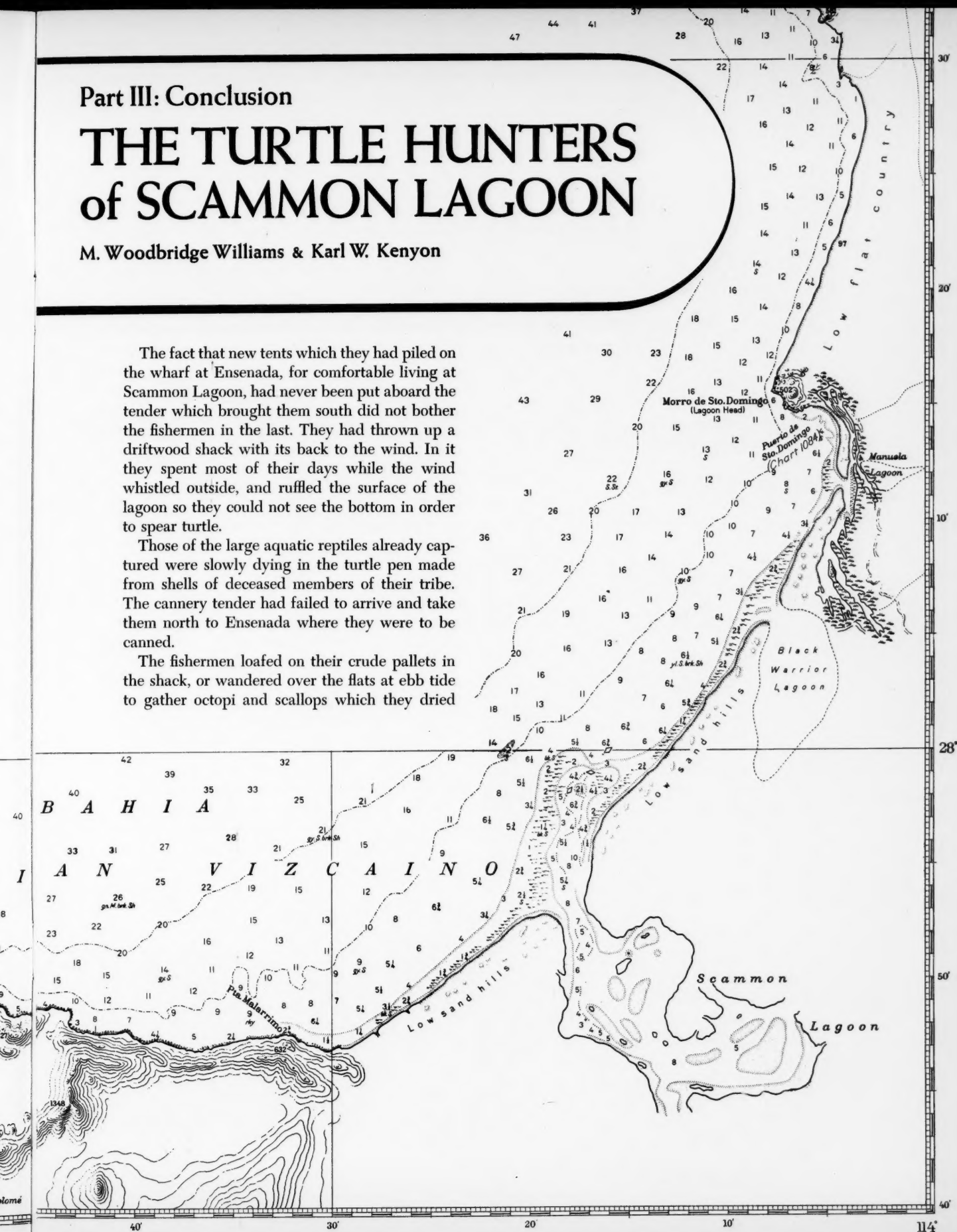
# THE TURTLE HUNTERS of SCAMMON LAGOON

M. Woodbridge Williams & Karl W. Kenyon

The fact that new tents which they had piled on the wharf at Ensenada, for comfortable living at Scammon Lagoon, had never been put aboard the tender which brought them south did not bother the fishermen in the last. They had thrown up a driftwood shack with its back to the wind. In it they spent most of their days while the wind whistled outside, and ruffled the surface of the lagoon so they could not see the bottom in order to spear turtle.

Those of the large aquatic reptiles already captured were slowly dying in the turtle pen made from shells of deceased members of their tribe. The cannery tender had failed to arrive and take them north to Ensenada where they were to be canned.

The fishermen loafed on their crude pallets in the shack, or wandered over the flats at ebb tide to gather octopi and scallops which they dried



and dangled on long strings in front of the shanty, perhaps as an emergency food supply. In fact, their entire existence had been reduced to an emergency status, for they had exhausted their food and were depending on the providence of the sea for their subsistence. They made occasional expeditions to the outer beaches where they found cases of navy emergency rations, army K-rations, gasoline and oil in drums, and firewood which they gathered to operate a crude fresh-water still on Isla Concha—their only source of fresh water.

Other relics from their expeditions were scattered about the shack: a hot-water bottle, a six-inch flare case, a small life raft, army mess kits, canteens, first-aid kits, shaving cream, and large glass balls—fishing-net floats—from Japan. Among the latter a green-tailed towhee lived, twittering and chirping throughout our stay, probably an eccentric, an individualist of its group who had wandered far from home. For normally, Karl said, green-tailed towhees lived in the mesquites of the Cape district several hundred miles to the south.

The bird had become so tame that it took water and food proffered by the Mexican turtle hunters.

Among the inhabitants of this curious environment created partly by man, partly by the currents which sweep down the coast and deposit large numbers of these oddities on the beaches of Vizcaino Bay, were ravens which hopped among the green glass balls, feeding on stray bits of flesh in the shells of recently slaughtered turtles. After eating their fill they would perch contentedly on top of the Japanese floats.

On our first visit to the camp we were treated to a meal of spam, navy sea-biscuits, malt tablets, candy from K-rations. The Mexicans used toilet paper from the rations to wrap cigarettes. We wondered if all these stores were simply thrown overboard by fed-up swabbies and troops, or represented another catastrophe on the outer coast.

After a foray to the *playa* the fishermen would spend the day gorging on their finds. They did not conserve, as they trusted that the beach would always yield more. And if worst came to worst, they could paddle about 20 miles up the lagoon to the old salt works once operated by a clandestine American company, and walk out over a road to El Arco which is on the main rut between the Cape and Ensenada.

Carlos was a strict Seventh Day Adventist, and he spent much of his time on his pallet on the ground reading the Bible; every meal was preceded by a mumbled prayer, and his eating was governed by numerous taboos. Curiously, he could kill a turtle but not eat it; he could eat fish, but not clams; only creatures with scales were considered proper diet. He could not drink intoxicants or coffee, but Lipton tea was sanctioned. Yet whatever critics may remark about such beliefs, the man's faith produced a humility which went right to one's heart, and his seriousness in religious matters was balanced by a delightful sense of humor.

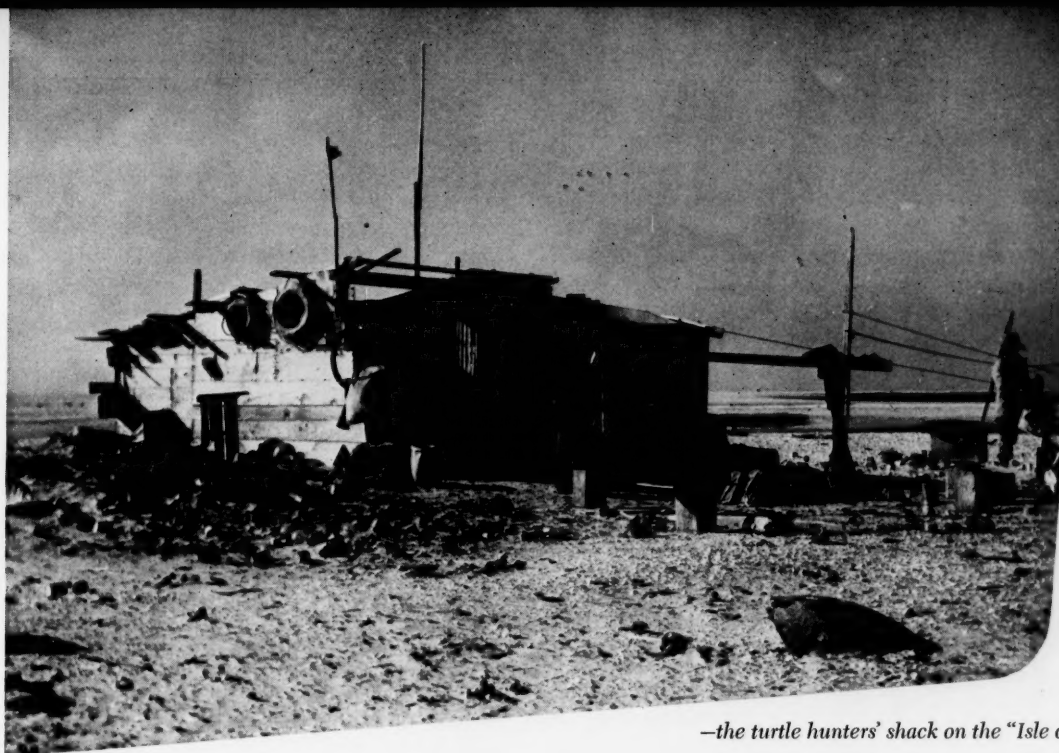
Tito, Carlos' uncle and the oldest member of the group of six, was camp guardian. Hard of



*We woke in the morning to find the sloop anchored off the tip of a low and tiny shell island that was almost awash at high tide. Mexicans call it Isla Concha. (In the right foreground, a turtle's carapace.) Ashore, we found—*

PACIFIC DISCOVERY





—the turtle hunters' shack on the "Isle of Shells"—

hearing so seldom speaking, he spent most of his time frying tortillas which the hunters wrapped around slices of breast of turtle after a successful hunt. The only time Tito was known to utter more than one sentence occurred one day when Karl went ashore to make hot cakes over the Mexicans' makeshift stove and found him alone. The old man was shocked at the black condition of our cooking utensils. This opened a deluge of Spanish which flooded Karl as Tito bared his heart for over an hour. Much of the conversation was lost to us, but Karl did gather that Tito was somewhat concerned over our knowledge of pearl oyster beds which spread across acres and acres of lagoon tide lands and were exposed at low tide.

Karl had found the first pearl in chowder made from this northern representative of the pearl oyster group of the genus *Pteria*. It was one of the tropical kinds that had reached north to Scammon

Lagoon in its range, along with other forms such as *Turbo* and a number of different bivalves, the most interesting of which were the pen shells and the large pecten, *Pecten subnodosus*. Scammon Lagoon appeared to be an area where tropical and temperate west American faunas overlapped.

Tito, like the three boys, was not a man of the sea as Carlos and Pedro were. One day when Carlos and two of the boys went down to the *playa* for wood to feed the water still, Tito hung out a lantern to guide them home over the flats that night, but he placed it on the wrong side of the hut, so that it was not visible to seaward.

The boys were strong, willing and good at the sweeps of the pongo, but novices in sailing boats, especially in the treacherous waters of the lagoon. They almost brought destruction to themselves when they jibed the crude craft and all were thrown into the water. Carlos was knocked un-



—surrounded by a litter of tin cans, turtle shells, and assorted glass balls; the net floats prized by Pacific Coast beachcombers had no scarcity value here!



*Mexicans in Scammon Lagoon hunt turtles from primitive craft called "pongos" propelled by long sweeps.*

conscious momentarily by a blow on the head. The contents of the boat including one oar were lost, and they had to drag the boat back over the flats without a guiding light on a pitch-dark night. Somehow by instinct that only reaches maturity in men who have been raised with the elements, Carlos led the group back to camp, arriving about midnight.

A week later, while we were on a trip up the lagoon to the salt works, Carlos picked up the oar on Isla Piedras, some 20 miles from the scene of their accident. Near-by was a large navy target, which stuck up above the lagoon like the masts of a wrecked schooner.

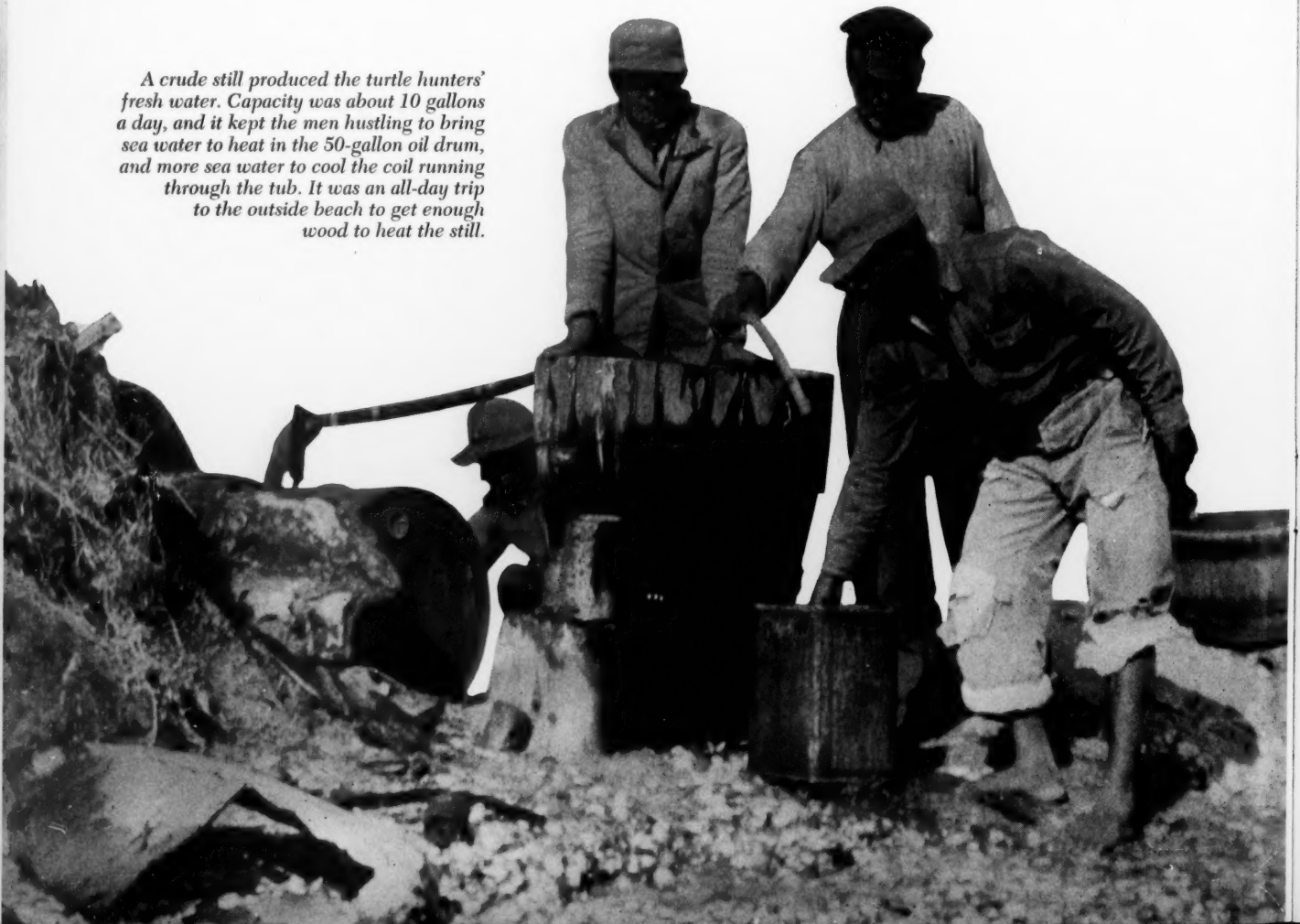
Garrulous Pedro had apparently come along for many reasons other than fishing turtle. He had seen much of the world, and the inactivity of the camp was perhaps hardest on him. He sat on a rickety stool most of the day and read and reread the one magazine and a tourist guide to Lower California which made up their library. His one other pastime was drawing plans for his dream cannery in Magdalena Bay. It seemed that before the revolution he had operated a sardine cannery

down there, but a strike by the workers with a demand for pay during the strike had broken up the business. Pedro simply departed from the scene of his business failure, leaving behind a freshly arrived shipment of tins from San Pedro. We wondered if bills for them were still being sent to Magdalena Bay.

Woody found out later that Pedro had chosen him for a partner in a new cannery venture in Magdalena Bay. This explained Pedro's occasional visit to the sloop with plans that had all the qualifications for entering some of our galleries of surrealistic art. Part of the cannery would be three-dimensional, part two-dimensional. In these layouts the pier running out from the cannery would hit you square in the face; critics would say the work had "punch"!

When not sleeping the three boys would sit hunched over a homemade checkerboard perched on a fruit box. They played the game with some of their precious supply of corn and beans. The game usually went on between Luis, the carpenter from Mazatlan, who was the only one to have built a bunk off the ground in the shack, and Jose,

*A crude still produced the turtle hunters' fresh water. Capacity was about 10 gallons a day, and it kept the men hustling to bring sea water to heat in the 50-gallon oil drum, and more sea water to cool the coil running through the tub. It was an all-day trip to the outside beach to get enough wood to heat the still.*





heavy-set and likable, who continuously wore an ancient tan overcoat during unsettled days, which was most of the time. Silviano, youngest of the boys, sat by and watched the game, or slumped in a canvas stool—another relic from the playa—and read when Pete was not utilizing the library. Outside, Silviano wore a dirty red bandanna across his mouth as he was plagued with a toothache. Nonetheless, his appetite was little diminished, and he consumed vast quantities of galleno eggs (bird eggs, mostly tern) and heavy rations from the open beach.

These idle days allowed too much thought of home, but occasionally the nor'westers blew themselves to exhaustion, and a morning would dawn when the only motions on the slick surface of the lagoon were tidal currents eddying around the lonely island. With the disintegration of the fog into wisps, a hot sun beat down, its reflection from the bleached shell surface of Isla Concha bringing tears to our eyes.

On such days the turtle hunters would readily see their quarry swimming along the bottom. Early in the day they would put out in their pongos to increase a catch which they were not certain would ever bring them pesos.

The pongos were propelled by two oarsmen, each pulling on a single long sweep. Carlos took charge of one craft, Pete of the other. They would stand in the bow, with two or more eight-foot turtle spears made ready, and scan the lagoon for

the telltale bob of a turtle's head, or the concentric ring of wavelets left by the submergence of the wary reptile.

When a turtle was sighted they would indicate its direction with their spears, and the oarsmen, stripped to the waist, would heave on the oars, their heavy muscles bulging under golden-brown skin. Once over the turtle, the fisherman would drive his spear downward into the reptile's shell. The point of the spear, however, was prevented from piercing vital organs by a collar back of the point. When the spear was made fast, the shaft separated from the head to which a stout cord was fastened. Then another spear was driven into the turtle, and the entire crew heaved on the lines to bring on board the animal which usually weighed 100 pounds or better.

It was an exciting chase, laborious and often heartbreaking. With their primitive equipment it was difficult for the fishermen to follow the erratic course of the turtle fleeing over the bottom. Often the creature would reach water too deep for it to be speared, and so escape. Seven was the largest number we saw caught in a day. The return on these turtles at that time would be about 70 pesos.

WE REMAINED IN SCAMMON LAGOON for two weeks, studying the birds and collecting sea animals on the many miles of rich sand flats. Carlos was our guide on several overnight trips to different shores and islands in the lagoon.



*It is one of the rare calm days. The wary turtle of Scammon Lagoon disturbs the surface slightly when he dives, giving himself away to the keen-eyed hunter who now sees him through the clear water, six or eight feet deep. Pointing the course to the sweepsmen with his harpoon held horizontal at shoulder height, Carlos Preciado follows the swimming reptile until the pongo's prow is poised close enough for a strike. Now he thrusts his harpoon straight down into the turtle's tough carapace. Notice the circular disc back of the harpoon point to keep it from penetrating deep enough to kill—the animals must be got to the cannery alive.*

On Isla Concha, Karl set up blinds and spent hours in them photographing nesting ospreys, and he also attempted to record the nesting of oyster catchers, but further study in the psychology of that interesting bird appeared necessary before a blind could be designed that would not frighten it from its nest. Karl tried his blind of burlap with no success, and then set up one of turtle shells which he inched closer and closer to the oyster catcher's nest each day, but the bird still kept outside its nest. Not even the trick which works so well with the osprey—two men go to the blind, one disappears inside, and the other walks away as if the blind were being deserted—fooled the oyster catcher. Perhaps the fact that these birds deposit their eggs in a shallow hollow, in exposed positions on the beach, makes them wary. One

pair Karl was observing moved their eggs higher on the beach on successive nights when a high tide flooded their original nesting site.

Like the ospreys, the oyster catchers were most numerous in Scammon Lagoon's wilderness of sand and water. Also, like the osprey, they have disappeared from many of their former haunts along the shores and on the islands of the California coast north of the Mexican border.

The group of oyster catchers nesting in Scammon Lagoon, as well as smaller populations on other Baja California islands, has long interested ornithologists. The reason is that the black and Frazer oyster catchers in this area interbreed and produce hybrid offspring that vary in the amount of their black and white markings. Griffing Bancroft photographed two downy chicks that were

hatched in the same brood by a typical Frazer oyster catcher. One of these chicks was nearly black, while the other had many white markings like those of its parents. Although the systematic status of these birds is not entirely agreed upon, it appears that instead of representing two distinct species the birds are, as Stresemann has indicated, simply subspecies or races of the same species. And this tendency among living forms toward infinite variation also extended itself to lower forms of life in Scammon Lagoon. Take, for example, the giant pecten, *Pecten subnodosus*.

This species lives as individuals scattered over the sand bottom and partially buried in shallow bowls. One finds them by wading at low tide and prodding with one's toes in likely looking depressions. Carlos called them "gatarinas"; the subspecies found in Scammon's is called *intermedius*, and is supposed to have one less rib on each valve, and be more lightly colored than the more southern typical form, but these giants which have the spread of a man's hand frankly were of more interest to us from the standpoint of their anatomy. You see there is a circular adductor muscle that makes the finest fried scallops in the world. . . .

But don't think that all our interest in invertebrates of the lagoon centered about their use as food—some of them were too fragile.

One evening after dinner we looked out the hatch to see gleaming bits of light floating on the black water. A thousand tiny lanterns drifted by us, leaving in their wake dim trails of soft, diffused light. We scooped up bits of this light in a kitchen sieve, only to have the radiant tissue burst into a shower of sparks as if an acetylene torch had suddenly burned into steel. The body of one of these creatures remained intact long enough to reveal its annelid form. Perhaps the worms had come to the surface in a nuptial dance like that of the famous palolo worm in the South Pacific.

WE CHOSE A CALM DAY to sail out over Scammon's bar. The feathers on the birds standing sedately upon the sandbars lay flat and tidy, for a change unruffled by the wind. A whale leaped from the bay in the distance, and we sailed directly out to sea over a bar which had seethed with white water when we entered. About noon we picked up the crests of Cedros Island, and by nightfall the *Seven Seas* slid in to anchor off the village on the lee side of the island.

Astonishing to us was the fact that even in the

*The hunters beach a green sea turtle on Isla Concha, where they kept all their captives in a makeshift pen until they could be shipped alive by boat to the cannery in Ensenada.*

early evening hardly a light showed in the village. Next day we found the reason. The supply ship from Ensenada was two weeks overdue and the village was out of kerosene. There was water, though. It came to the village through a two-inch pipe from dependable springs back in the hills. The line ran onto the cannery wharf, and we filled the *Seven Seas*' tanks till they overflowed and the precious liquid poured out onto the decks without comment from the bystanders on the wharf.

Lateness of the supply boat appeared to be routine and was complacently accepted at Cedros village. Nor did a letter Carlos wrote to the customs inspector at Cedros and entrusted to our care rouse much excitement. The people didn't seem particularly concerned over the welfare of the turtle hunters; all the Cedros Islanders wanted to know was how many turtle had been caught. The Mexicans were somewhat amused over our impatience to receive mail. Of course there was none when we arrived. However, they appeared sympathetic in speeding our communications with California. When a wireless telegram arrived via the government station at the village, two soldiers rowed out in a skiff to the *Seven Seas* in the capacity of Western Union boys.

While waiting for mail we dredged close inshore along the coast and struck an interesting fauna of bryozoans off a spring marked by date palms about a mile north of the village. The bot-





tom was actually a low forest of branching forms of this group, flourishing much like coral on a tropical reef. The bryozoans were mostly associated with temperate waters, but also coming up in the dredge were spiny murex whose affinities were undoubtedly in the warm waters of the Gulf. Here again we found mixing of faunas in this area half way down the peninsula of Baja California where hardier tropical forms have penetrated into cooler waters.

Perhaps the richness of life in this area was augmented by seepage from the spring which washed nutrients into the sea from the island. For even the fish fauna was extremely plentiful. One evening Karl pulled in bass as fast as he could re-bait his hook, and it is in this same area that American tuna boats congregate to net sardines for bait before going farther south to fish.

Much of this bait fishing is carried on at night when the fleet blazes with light under the black

shadow of great cliffs that rise up from the sea. First, large cluster lights are suspended over the stern to attract schools of sardines. Once the water begins to churn with fish, the cluster light is replaced with diesel oil flares that seem to hold the fish despite the disturbance made by the net, which is wrapped around the school from a skiff going in a half circle away and then back to the stern. The nets are pulled and the fish dumped into live bait tanks on the after end of the boat. Often boats would spend several days in this picturesque spot trying to find bait, the competition for bait in this overcrowded industry being as keen as the competition for tuna.

Upon such precarious assurance of success, great sums of money had been spent in outfitting many of these vessels, some of which were as luxurious as many yachts, and complete with all the modern navigation aids that have been developed during the last decade. Others coming south were not so replete, or luxurious, but converted craft, or old timers, mellowed and stained by the sea.

We recall in particular the *Westerly*, a yacht converted for tuna fishing, which was having trouble with her refrigeration system. We went



*Karl set up a blind a few yards from the nest of a family of ospreys. This "young" nest on Isla Concha may rise year by year to several feet above the ground as the birds add new material to it each season.*

OPPOSITE PAGE: A young osprey stands in its nest and exercises its wings while another one rests on top of a pile of twigs and boards the parents gathered from drift on the beach.





ashore with her crew to a dance at the cannery where the villagers shuffled over a rough concrete floor with steel rails for carts running down the center. Families drifted in and out, and a three-piece orchestra played from a makeshift stage. Garrison soldiers in long overcoats, leather cartridge belts, and carrying immaculately polished Springfields, lounged about the entrance. Their commandant was a huge man in his long overcoat, with coarse features and sunken eyes. The *West-erly* had had some trouble with him, and they were charged for water at the cannery dock—ours had been obtained free.

An American arrived at the dance, white as a ghost except for a livid scar that creased his forehead. The town was technically dry, but the population appeared to have a sufficient cache of *tequila* to last for many dances. The pale man swayed about the dance floor with his Mexican wife, but said good evening to all of us as courteously as could be. During the day he was electrician for the cannery and had been on the island for many years—used to hunt deer on the north end. He lived across the arroyo from town in a hut no different from the rest: dirt floors, and walls papered with bright pictures from American magazines.

Woody had access to hot water in that humble dwelling for the first time in over a month. While he washed in a tin bowl a row of brown faces at different levels above the floor crowded around to watch the procedure. The white head of the house wasn't sure just how many of these were his own.

Then there was short, jovial Steve Carnegiala of San Diego, who skippered the *Golden Gate* with a whiskey voice. His crew stoked us with food, and we remember their cook Eddy, a provocative, talkative Italian, who wore an engineer's cap backward like a racing driver and could make a humble stew into a king's banquet. He claimed to have killed two Mexicans in the Gulf by overfeeding them, and he almost finished Woody, who overstuffing on ice cream and cake.

But the ship we were most glad to see was the *Mary Irene* which came churning down from 'Pedro one warm afternoon, with passengers swarming over the superstructure and upon loads of lumber and tin cans. Her skipper with a two-day beard on a tired face said he had some mail for us but had given it to the cannery superintendent. After an exasperating hunt we found the packet, and with assurance that all was well at



home we pulled anchor and set out for Natividad, across Kellet Channel, a few miles to the south of Cedros Island. Natividad is important to shipping because it is one island with a dependable lighthouse.

NATIVIDAD WAS THE MOST BARREN ISLAND we had visited. Sparse vegetation, mostly cactus and thorn bush, covered much of it while sloping alluvial fans formed a band of hard dry earth above the bluffs around the island where almost nothing grows. Yet this band of dry earth was, to us, one of the most interesting areas of the island because it was laced by thousands of black-vented shearwaters' burrows.

During the day not a bird of this species did we see close to the island. Like auklets and mur-relets, they swarmed about their nest burrows at night. We found the lighthouse keeper and his family not at all sympathetic toward the birds,

Cedros Island village—  
a sardine cannery spreads  
along the waterfront; the  
towers of the new church  
the villagers built rise  
against the island's  
desert hills.



many of which we found dead around the light. The reason was that the birds made so much noise, "scratching and groaning and muttering from their burrows beneath the building at night." The assistant lighthouse keeper, who was preparing to leave the island, insisted that all the birds were good for was to feed cats.

Unfortunately cats had got loose on the island, and they ran over it now in fairly large numbers. We examined many cat droppings, and found they all contained feathers. Thus the cats are undoubtedly a serious menace to the shearwaters and other ground-nesting birds of Natividad. Goats once roamed over the island, but the Mexicans realized they were denuding it of its sparse vegetation and exterminated them several years ago.

The ridge of the island was carpeted with the thickest tangles of cholla, *Opuntia*, that we had ever seen. Living among these masses of cacti were desert land snails of the genus *Micrarionta*,

close in form to those inhabiting Cedros Island. As fossils we found a smaller *Micrarionta*, chunky in shape, that appeared to resemble more closely the small race on the San Benito Islands, northwest of Cedros. These fossils were imbedded in a white shale on Natividad's east side.

During our stay at this desolate island we lay off the south end by Flat Rock, a table-top mass connected to Natividad by a jagged reef. Cormorants breed over the top of the rock, and have consequently produced considerable guano which is now being harvested by a Mexican concern that also operates several other deposits on rocks along the Baja California coast. The company maintains a man on the island to guard the deposits and also to operate a weather station on the east side. This keeper proved to be a born naturalist and took great interest in our work. He presented Karl with an egret skin he had stuffed without instruction—it was a good job for an inexperienced hand. Curiously enough, the egret was a new record for Natividad.

Karl also found one other species not listed by Lamb in his 1931 report in the *Condor* on the birds of Natividad. House finches were common on the cholla and brush covered hillsides of the island, and they had the yellow coloration which in island forms often replaces the red coloring of mainland house finches. Mr. A. J. van Rossem also

collected these finches on Natividad in 1944, but it may be likely that the birds have migrated to the island since Lamb's visit. Since Cedros Island is only ten miles away, perhaps their visit to Natividad is seasonal.

The island's lighthouse keeper was a dignified, educated man who also took an interest in our work, and put on a clean white shirt and necktie for his photograph which was needed for some official papers. He presented us with a specimen of a giant scorpion collected on the island, which had been a prize showpiece in a cabinet in the rather dismal hallway to their living quarters at the foot of the lighthouse tower.

He didn't have many opportunities to display the find to visitors, as we had been the only Americans on the island that year, with the exception of the crew from the *Blue Eagle* of San Pedro which brought them a few supplies on their shark fishing expeditions.

The station was without communications to the mainland—surprising considering the importance of this light, one of the chief aids to the coastwise traffic running down outside Cedros, and the fishing traffic going through Dewey Channel, four miles wide, between Point Eugenia on the mainland and Natividad. After our return from the trip we got a letter from Natividad asking us to locate a wind generator so they could have power to operate a radio.

We found Natividad cold and windy and its arid landscape depressing after three days, so we set sail again for Cedros. The morning we weighed anchor was clear and bright and we were impressed by the vivid color contrast in our surroundings as we left. The sea sparkled in the early morning sun while a flock of hundreds of shearwaters swept cyclonically across the sea ahead of us. As the birds glided and wheeled near the water their white breasts caught the sun, making

*Short take in Cedros village:  
Grandmother ignores Karl while he studies  
a caged bird, gives the camera a cold eye  
when Woody moves in for the close-up—  
but keeps right on shelling peas.  
Modern enamelware contrasts strangely  
with the ancient stone metate.*



the flock appear like a swirl of giant snowflakes, lost somehow, here in the sunshine. The yellow cliffs of the island's west face rose sheer from the breakers, and the broken precipices cast heavy shadows along their own irregular surface.

As we headed out into Kellet Channel for Cedros, the tide rip hit us. It was strange to see whitecaps with a heavy chop with hardly a breeze blowing. The light wind made us poor competitors against the strong current that swept us toward the open sea. Karl went below and had just started the engine and poked his head up through the hatch when we hit a violent eddy that heeled



*Starkly "modern" appears the long, flat dwelling of the Natividad Island lighthouse keeper, giving no relief to the bleak desert island landscape.*

the *Seven Seas* over. Woody was making the boom fast. As we lurched, it caught him in the midriff and tossed him overboard. Karl was tempted to get his camera, but a man overboard is not a matter to be taken lightly in rough water and Karl immediately had visions of facing Woody's wife with pictures but no Woody, so he decided to forget the camera. Luckily the *Seven Seas* turns on a dime, but even so he lost sight of Woody several times among the unnaturally large choppy seas before that soaked marine biologist scrambled back aboard.

This was our last catastrophe (we use the strong term relatively). A crossing every sailor we met

on the coast had predicted would trouble our little sloop we made without incident. This was the passage from the north end of Cedros 63 miles due north to Punta Canoas on the mainland. Carlos had said he wouldn't make this trip for a thousand dollars; the tuna men also warned us. We were prepared to ask for a tow if it looked too rough, or at least wait for a considerable spell under the lee of Cedros' north head for a calm night to cross.

We had expected to spend the time collecting on the pine-studded high ridges of the island, an interesting transition zone—a fog forest whose survival depends on moisture being swept from the sea below and condensing on the peaks. This took place only on a narrow band along Cedros' crest. Within a stone's throw of the pines one was again in desert terrain characterized by grotesque elephant trees.

But when we came up to the end of the island it looked as if we would not have to wait for our chance—it was there. We headed out to sea and next morning as the sun rose picked up Canoas several miles to the east.

After a layover in the lee of Cabo San Quintin waiting the end of a nor'wester, we again worked our way up the coast. Nine days after leaving Cedros we chugged up San Diego Harbor. As we glided under Point Loma's yellow cliffs into the calm waters of the bay, the civilized landscape opening before us seemed in strange contrast to the desert hills and empty wastes of Baja California such a few miles to the south. The white houses sparkling in the sunshine surrounded by swaying eucalyptus trees, and moving automobiles, were oddly unfamiliar after the past two months. Woody took one look at his new surroundings and ducked down below to whack off his beard. Karl, somewhat more reluctant to break away from the wilderness, trimmed his.

At the Customs dock an inspector from the Department of Agriculture came aboard and found two seagoing desert rats amidst the most amazing cargo he ever saw enter the port of San Diego.

One item among our conglomeration of specimens the inspector failed to see. This was our host of unwelcome tiny creatures, hidden as they were for the most part among the folds of our sleeping bags. The ancestors of these fleas we had gathered inadvertently on our visits to the camp of the turtle hunters of Scammon Lagoon. Perhaps, we surmised, our inspector would, like us, discover these invisible guests later.

END



# CONSERVATION

WILLIAM P. DASMANN

## Can We Hold the Western Range?

WHEN THE STOCKMAN FIRST RODE INTO THE WEST the range was free. The lands were claimed by the United States but had little or no administration. They could be used without payment by anyone who could hold them.

Finding a range that suited him, the stockman took possession by turning his livestock loose to graze, and filing on a homestead. Where possible, he located his homestead lands so as to enclose the permanent available waters. Then he set himself to hold his range against all comers.

A vegetation cover of highly nutritious forage plants flourished on much of the virgin range. The herds of buffalo, antelope, elk, and deer that thrived on parts of it did some localized damage but caused no general range deterioration.

As news of this cow paradise, without rent or taxes, was noised about, more stockmen drove their herds west. The trend in settlement rose sharply once railroads began to finger into the West and provide means of shipping livestock to Eastern markets. More and more stockmen and speculators moved in to reap as much as possible from these free lands while they were still free. Rumor had it that the forage was inexhaustible. But steadily increasing numbers of livestock soon proved this notion false.

### Years of Destruction and Conflict

So long as the lands were wide and men and their cattle scarce, little extensive damage was done to the range. But when livestock operators began to elbow one another for free grazing on the public domain, trouble came. The palatable classes of vegetation were depleted under the pressure of overcropping. Plants weakened, failed to reproduce, began to die out. As rents appeared in the vegetation cover, the fertile topsoils—products of many million years of natural soil development—were exposed to sun, wind, and rain and so started to bake, to leach, to blow and wash away. Less palatable classes of vegetation reached out to take over large areas of range land.

Because livestock was then sold by the head, not by the pound as it is now, there was no premium on fat animals. Stockmen strove for large herds rather than for heavy weights. They were satisfied with thin animals, so long as there were lots of them. With the pressure increasing, an individual operator could no longer hope to hold an area of

public range exclusively for his own use. Where he left reserve forage, another operator would slip in his livestock to take it. Hence there was no point in moderate grazing.

Range wars developed. Stockmen fought fierce battles over grass. The Pleasant Valley War in Tonto County, Arizona, took at least forty lives in a single season. In central Oregon, the Crook County Sheep Shooters Association publicly bragged of slaughtering between eight and ten thousand sheep in one year. Similar conflicts raged in many other areas.

Towards the end of the century livestock numbers were still increasing, but forage was definitely on a fast decline. Then nature began to claim payment for the damage done her. Cattle and sheep starved on the range. Droughts and hard winters added to the toll. There were great losses of livestock in south central California in 1864. In 1887, 80 per cent of many large cattle herds in Montana perished. Between 1891 and 1894, 250,000 out of 800,000 cattle succumbed in Arizona, and in many places throughout the West 25 to 50 per cent of the livestock died on the range.\*

*\*The Western Range, a Great But Neglected Natural Resource. Senate Document 199. U. S. Government Printing office, 1936.*



*A vegetation cover of highly nutritious forage plants flourished over much of the virgin range.  
(U. S. Forest Service Photo)*

JULY-AUGUST 1950



The extent of big game losses during these years is not known. It is customary to blame the decimation of big game herds during this period on unrestricted killing for meat and hides. But there can be no doubt that depletion of forage on their natural ranges played a part in big game losses.

#### Creation of the National Forests

In the nineties, destruction of public lands had reached the stage where it was becoming a national scandal. Congress felt called upon to do

something to halt the devastation. In 1891 Congress passed the Forest Reserve Act, and the same year President Harrison withdrew 2,500,000 acres from the public domain as forest reserves. Succeeding presidents withdrew other areas, placing formerly unregulated lands under accountable administration.

The regulation of grazing on forest lands, although at first loose, sometimes misdirected, sometimes ineffective, generally resulted in an early reduction in "animal months" of use by livestock on forest ranges. This gave a measure of relief to many forest areas. It is noteworthy that the general trend in big game numbers turned upward during this period. But reductions inside the national forests often tended to push surplus livestock into that large area of public domain outside, which remained more or less unregulated, open, and free. Range depletion continued at an accelerated rate on the public domain and on many privately owned ranges.

During the first world war the demand for American meat rose sharply and livestock prices responded accordingly. The Forest Service was induced to increase grazing permits to help the war effort, and additional livestock was crowded onto the public domain and onto privately owned ranges. Unfortunately, this increase in pressure coincided in some parts of the West with the start of a severe drought that lasted from 1917 to 1936.

For the West generally the trend in range destruction culminated in the middle thirties. Many of us will remember this period of dust bowls, of drought, of starving livestock, of government riflemen shooting thousands of animals on the range. During 1934 the Government purchased more than 11 million head of cattle, sheep, and goats to help alleviate the bad situation. It was then that big game problems became prominent in many Western states. Deer starved to death on winter ranges in Utah, Colorado, Oregon, and other states. Game departments learned there was such a thing as too many deer. In 1936 the Forest Service estimated that the Western range, including all types of ownership, had depleted more than 50 per cent from its virgin condition. It was stated that a range once capable of supporting 22.5 million animal units could then carry safely only 10.8 million.

During the thirties the Forest Service initiated the program of heavy reductions in permitted livestock still in progress today on many forests.

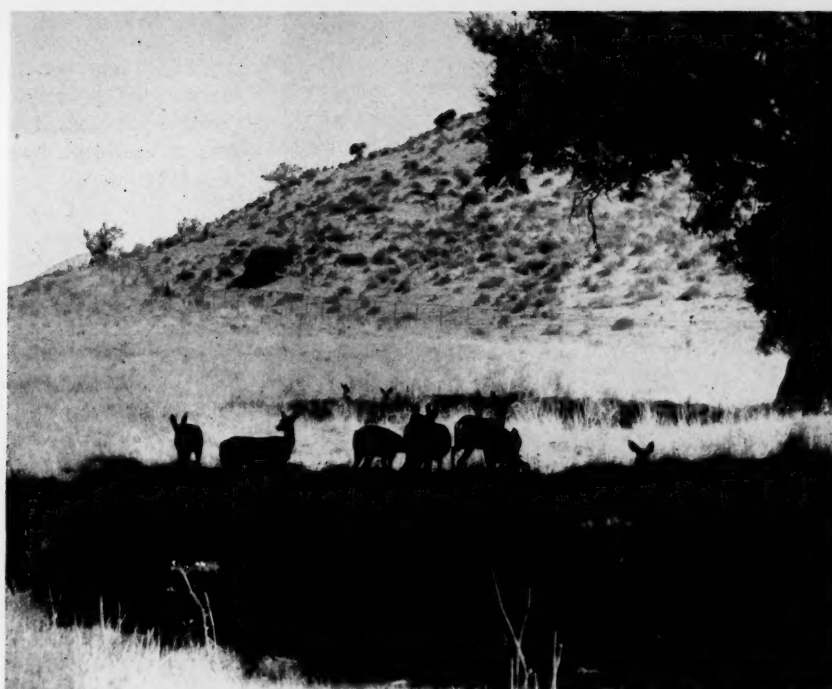
*Where the cover is broken, each rain cuts deeper, the runoff waters carrying away more and more of the precious topsoil. (Calif. Division of Fish and Game)*



*As rents appeared in the plant cover, the fertile topsoil began to bake, to leach, to blow and wash away. (California Division of Fish and Game)*



*Game departments learned  
there was such a thing as  
too many deer.  
(California Division  
of Fish and Game)*



In 1935 Congress passed the Taylor Grazing Act, which placed under regulation of the Grazing Service the larger blocks of the remaining 165 million acres of public domain. Also, game departments in many Western states learned to recognize the importance of range in big game management, and the need for balancing game animal numbers against the supply of available forage crops on game ranges.

THE STORY OF THE WESTERN RANGE as told above is not the whole story. It is too simplified to give the full picture of cause and effect, too generalized to apply to all areas.

One fact that has become apparent over the years is that the art of range management cannot be reduced to a few simple formulas that may be applied everywhere. Although certain underlying principles, such as those of plant succession and plant nutrition, may have universal application, the number and variability of the factors involved in the range complex make it dangerous to generalize.

The objective in range management has been stated to be the sustained production of forage crops and the control of waterflow to optimum capacities of range sites. This can be accomplished where there exists a balance between the major

site factors—climate, topography, soil, and living things.\* Nothing can be done by man to change regional climates or extensive topographies. But man can work with soil and with living things.

#### The Evolution of Soil

Man can work with soils directly through the addition of organic and chemical fertilizers, through tilling, contouring, terracing, draining, water-spreading, and the building of erosion-control structures. But these measures are not practical economically for general use on range lands. The only practical method of controlling range soils extensively is through the medium of vegetation. Of the major range site factors, it is the factor "living things" with which the range manager must work in most instances.

The evolution of soil from bare rock to fertile field is a process accompanied by a succession of vegetation changes. Weathered rock supports lichens which assist mechanically and chemically in breaking down rock to a fraction that will sustain shallow-rooted, short-lived annuals. As soil

\**Principles and Indicators for Judging Condition and Trend of High Range Watersheds.* Lincoln Ellison and A. R. Croft. Intermountain Forest and Range Experiment Station, Ogden, Utah. 1944.

cover is so important, the need for maintaining it in a state of balance with the other site factors is obvious. How can this be done where vegetation is used for forage by range animals?

#### **Range Principal and Interest**

Anyone who has raised flowers or fruit knows that, while a certain amount of pruning stimulates the growth of plants, too much clipping of leafage over and over weakens the plants and finally kills them. Although range forage plants may differ in their tolerance to cropping, and this tolerance even may change with seasons, there are limits beyond which additional cropping will weaken and kill the plants. The effects of overcropping may vary from a diminished annual growth to complete eradication of a plant species, depending on the species involved and how intensely it is used.


It is a simple case of principal and interest. The range soil, and from 20 to 50 per cent of the available vegetative growth (depending on plant species), should be considered principal. This may be called the range maintenance reserve, necessary to sustain the plants and keep them in thrifty, productive condition.

The other 50 to 80 per cent of the available vegetative growth may be treated as interest. So long as only this amount, which may be called the annual forage crop, is taken and none of the maintenance reserve, the range can continue to produce crops of forage on a sustained yield basis.

But where too many animals graze they will consume not only the interest but go on to eat part of the range principal as well. Oftentimes this fraction is fully as palatable and nutritious as the fraction making up the annual crop. This is the reason why fat animals are found on depleted range, and why flesh condition of animals is no sure indicator of range depletion. On large areas the consumption of range principal may go on for years before flesh condition of the grazing animals is affected. When the range principal is consumed to the point where animals show poor condition, depletion is often so far advanced as to make it too late for anything but drastic measures. To regulate grazing to the level where only the interest is taken each year is the keystone of range management.

#### **Effects of Selective Grazing**

All grazing and browsing animals show selectivity in their choice of forage. Some plant species



accrues, the annuals are replaced by deep-rooted perennials. The soil supports the plants. The plants till, fertilize, shade, and hold the soil. This process goes on until we find the fully developed soil supporting a high successional stage of vegetation which is dependent upon the soil, just as the soil is dependent upon the vegetation, for maintenance.

What happens when the vegetation cover is depleted?

There is less interception of sunlight and rain, less deflection of wind. The humus, dried by the sun and torn by the wind, starts to ravel, to blow and wash away. Rain begins to fall directly on the soil surface. The soil pores and root channels become plugged with silt and are unable to convey rain water into the subsoil. There are fewer plant bodies, less litter, to baffle the little waters. These waters build up head, gain velocity, join with other waters, pick up silt, leach, wash, and cut the soil, and carry it downhill towards the sea. Each rain cuts deeper, the runoff waters carrying away more soil.

Where the waters run they carry soil. Where the topsoil is lost, the capacity of a site to produce vegetation is lessened. Where the vegetation cover is reduced, water runoff increases. Thus does the destructive wheel of depletion gather momentum as it rolls, until a new balance between site factors is reached.

It is estimated that it takes nature three hundred to a thousand years to produce one inch of topsoil. Where soil is lost faster than it is replaced, the resource is going into the red. Since vegetation

are eagerly sought; others are seldom touched except where starvation diets prevail. Range managers consider it axiomatic that range animals can alter the vegetation of a range. On ranges overstocked with grazing and/or browsing animals, selective grazing favors the spread of the less palatable and nonpalatable plant species. If the less palatable vegetation is in turn overcropped, a still lower class of vegetation may move in to take over the living space.

There have been great changes in the composition of cover types on the Western ranges during the last one hundred years. An immediate example is the annual vegetation type cover now dominant on the Pacific prairie region in California. Here an original composition made up principally of perennial grasses has given way to aggressive exotic annuals as a result of range abuse. Consequently, the green feed period in much of California is considerably shorter now than formerly, and there is now a definite shortage of late season nutrients.

Less obvious examples of forage depletion through compositional changes may occur on brush ranges overstocked by deer. Overcropping of the better class of shrubs may result in their gradual replacement by less valuable brush species without much altering the appearance of the landscape to casual observation. Where the loss is among critical forage species, such as those that offer nutritious food at times when most plants are low in nutrients, consequences may come abruptly.

#### **Fire as a Factor in the Range Complex**

We have said that sixty years of overgrazing, intensified during one period by ruthless competition among livestock operators and during another

by severe drought, has led to depletion of the Western range. Other factors played parts less frequently recognized. One of these is fire.

There can be little doubt that fire, in varying degrees, has always been a factor in the range complex. It is not only possible, but quite probable, that some of the range forage types present at the time the West was settled were fire climaxes. It has been suggested that recurrent fire was a factor in holding the line between prairie grassland and surrounding tree and shrub vegetation. The dense scrub cover in the California chaparral type is considered a fire climax which would advance to a woodland stage were it not repeatedly burned. Conversely, the heavy invasions of juniper, sagebrush, mesquite, and other trees and



*There can be little doubt that fire, in varying degrees, has always been a factor in the range complex.*

*ABOVE: In California much land that once supported timber types has been invaded by chaparral brush species as a result of fire.*

*LEFT: Invasion of juniper trees into areas once cleared as grassland may be as much the effect of reduced fire occurrence as of depletion of the herbaceous cover. (California Division of Fish and Game)*



shrubs into areas once classed as grassland or savannah may be as much the effect of reduced fire occurrence as of depletion of the herbaceous cover.

In some Western vegetation types it is probable that reduction in fire occurrence contributed to the lowering of the grazing capacity for livestock. The heavy use of the herbaceous cover by livestock in these vegetation types reduced the amount of flashy fuel and cut down fire occurrence. This, in conjunction with reduced competition from the

in grazing capacity as a result of overstocking by range animals, but the acreage of good grazing land has been shrinking steadily in some areas for lack of fire, in others because of fire.

#### **If and When it Rains**

Like most agriculturists, stockmen are likely to blame too much on the weather, often forgetting that periodic drought is normal in the West. The original vegetation cover of the Western range was there despite droughts, in fact one may truthfully say it was there because of droughts. It was there because it had developed drought resistance and had become adapted to drought conditions. It maintained itself no matter what the diversities of climate because natural selection had fashioned it into a product of that climate. And, in spite of fluctuations in rainfall, this vegetation cover would be present still had not overcropping and other abuses destroyed it.

There is truth, nevertheless, in the stockmen's claim that drought is more common now than formerly. But the "drought" which has come to the Western ranges even with no major long-time change in climate has been induced, in part, by the stockmen themselves. The normal development of site is from dry (xerophytic) towards a humid (mesophytic) condition. Where disturbances upset this development, the trend is reversed. When range depletion has lowered the capacity of soil to absorb water, a condition sim-



*When ground water is diminished because of excessive runoff or transpiration by woody vegetation, springs and small streams may weaken or dry up altogether. (Calif. Div. Fish and Game)*

depleted herbaceous cover, favored a fast invasion of woody plants into areas where once they were scarce. The net result was a lowering of the grazing capacity for livestock and, incidentally, a rise in carrying capacity for deer.

On the other hand, the increased occurrence of fires in some vegetation types that followed increased human use has no doubt caused depletion of livestock range. In California much land that once supported timber types, which offered some herbaceous forage for livestock, has been invaded by chaparral brush species as a result of fire.

These ecological trends help explain the continued decline of livestock grazing capacity despite heavy reductions in animal numbers on Western ranges. Not only has there been a decline



*Successful reseeding techniques have been developed for use on better classes of range soils. (U. S. Forest Service Photo)*



ilar to drought occurs. Where once an inch of rain worked wonders in starting a vigorous growth of vegetation because practically all of it sank into the soil, now several inches of rain may hardly suffice to do the same because most of it runs off and is wasted. Also, diminished ground water—result of runoff or transpiration by woody vegetation—may cause springs and small streams to weaken or dry up altogether. Hence the signs of drought may be all present, even with rainfall the same as when forage and water were plentiful. Even drought may be alleviated, therefore, by proper range use and maintenance of a healthy stand of herbaceous perennials.

REDUCTION IN NUMBERS of range livestock, adjustment of grazing seasons, some scattered practice of rotation grazing—these have stopped the downward trend in range condition in some places, and have resulted in a definite improvement of range conditions in others. But, too often, livestock operators have been satisfied with rates of stocking that merely slow down, rather than eliminate, the consumption of range capital. And, too often, range managers have labored without consideration of adverse ecological trends.

#### **The Shape of Things to Come**

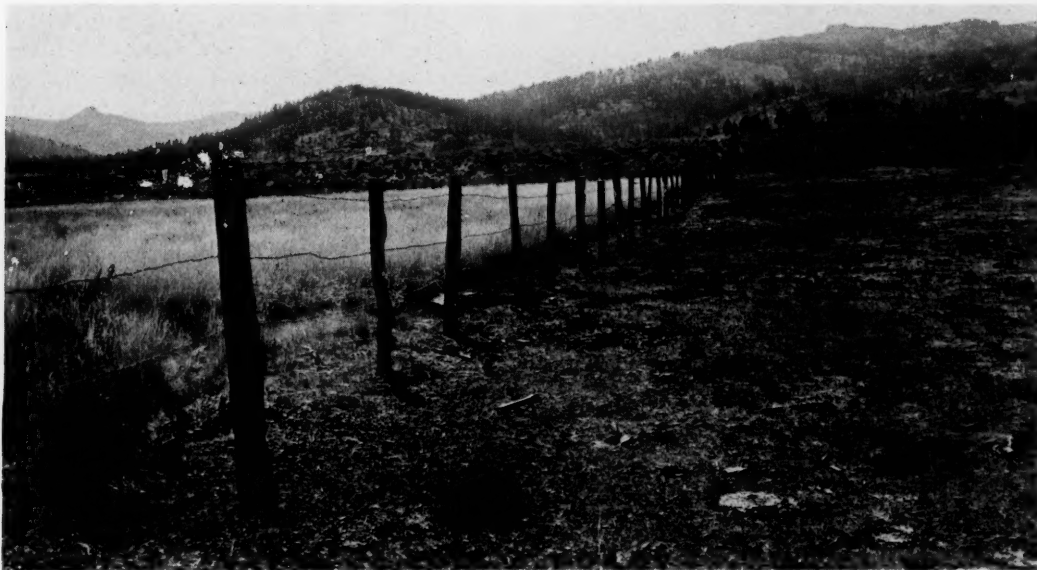
A more aggressive approach to the reclamation of depleted livestock range has become apparent recently. There has been a development of suc-

cessful artificial re-seeding techniques for use on better classes of range soils. Considerable research, and some successful practice, is under way in the clearing of undesirable woody plant species from livestock ranges by mechanical and chemical means, and by controlled burning.

An increase in range reclamation may be expected in the not too distant future. The world human population has increased an estimated 14 per cent in the last decade in spite of losses by war and famine. The population of the United States has jumped 10 million since the 1940 census. All this bodes a mounting demand for food. As the demand for meat increases, the need for rehabilitation of brushed-up and depleted range lands will grow. Artificial re-seeding to native and exotic plant species, controlled burning of brush and debris where this is beneficial and economical, mechanical and chemical improvement of better sites—these, along with essential improvement of livestock management practices (without which all such measures can only lead to further depletion), no doubt will be employed to increase the grazing capacity of Western range lands.

To close with an example indicating possibilities: the Forest Service has reported that the livestock grazing capacity of the 39 million acres of forest range lands in California may be doubled from 75,000 animal units to 150,000, by means of better livestock management and artificial re-seeding.

END



*A study in overuse versus nonuse: one side of the fence is heavily grazed, the other is protected from livestock. The point of balance must be found, the optimum—use on a sustained yield basis. (U. S. Forest Service Photo)*



# THE ACTI—American Family

**GRAHAM HEID**

*Native to the Americas,  
the cacti comprise  
a family of bizarre forms,  
paradoxical adaptations,  
and extraordinary  
range of size.*

## **Photographs by the Author**

HOW HOT IT WAS I DON'T KNOW, down there close to the ground in the full desert sun. Our thermometer was marked only to 130°, but the mercury had completely filled the tube. And there, on that parboiled sand, was a hemispherical mound, entirely covered with delicate orange flowers!

It was a plant of the Mojave hedgehog cactus—*Echinocereus Mojavensis*—in full bloom. As though it isn't enough that these plants can exist—even thrive—in the desert heat, the wonder is increased by their flowers of orchid-rivalling colors. Native to the Americas, the cacti comprise a family of bizarre forms, paradoxical adaptations, and extraordinary range of size. Their point of origin was probably in the West Indies, from which they spread north and south on continental America, until today representatives are found from Canada to Patagonia. That's a wide sweep of country and it contains an infinite range of environments. Still, there are few places where the cactus does not occur.

High in the bitterly cold Andes, there are considerable areas where the only vegetation one might see is the cactus—literal forests of stately

*The organ pipe cactus (*Lemaireocereus*) and the taller saguaro (*Carnegiea*) are the only giants of the family in the United States, their range extending from northern Mexico into Arizona. RIGHT: *Echinocereus coccineus* brightens parklike juniper woodlands of northeastern Arizona with its flame-red flowers.*



"Tuna" is what the Mexicans call the several species of edible prickly pear (*Opuntia*).

columnar plants, tolerant of extreme aridity and freezing temperatures. Diametrically opposite is the warm, humid environment of the jungles. Yet here, hanging from the trees along with orchids and Philodendrons, are the Epiphyllums—parents of those gorgeous hybrids known to gardeners as "orchid cacti."

But in the desert regions of Mexico and our own Southwest, the Cactaceae reach a climax of diversity. Of size? Yes, from the tiny two-inch *Epithelantha micromeris*—a minute globe from



LEFT: Arizona's state flower—the white saguaro blossoms usually appear high on the tips of the stems, sometimes fifty feet above ground; this offshoot was only eight feet up.



ABOVE: Beware the velvety spicules of the beavertail (*Opuntia basilaris*)—they are more insidious than the large upcurved "fishhooks" of (LEFT) *Mammillaria microcarpa*. This member of a large genus of small cacti has delicate pink and white flowers, and is one of the most numerous and widespread Southwest species.





ABOVE: Flowering head of a barrel cactus. Chief genera of this group are *Ferocactus* and *Echinocactus*, in which are found the famous visnagas, the barrel cacti whose pulp has provided a lifesaving drink to many a desert traveler. The authorities Britton and Rose reported a specimen of *E. visnaga* weighing at least one ton, with an estimated age of 1,000 years. They also saw one 10 feet high and nearly half as wide, estimating its weight as two tons! (van Laren, p. 64.)

RIGHT: A colony of *Bergerocactus emoryi* in Baja California. Against the sun, its spines look like a golden aura around the stem. The one species of its genus, this beautifully colored cactus is native to San Diego County, northern Baja California, and the Channel Islands.



Western Texas—to the well-known *Carnegiea gigantea* and other columnar types, attaining a weight of many tons.

Diversity of form? Yes, from the flat-jointed *Opuntias*, or tuna cacti, perhaps better known as prickly pears, to the massive, barrel-like stem of *Ferocactus*, the visnaga or barrel cactus.

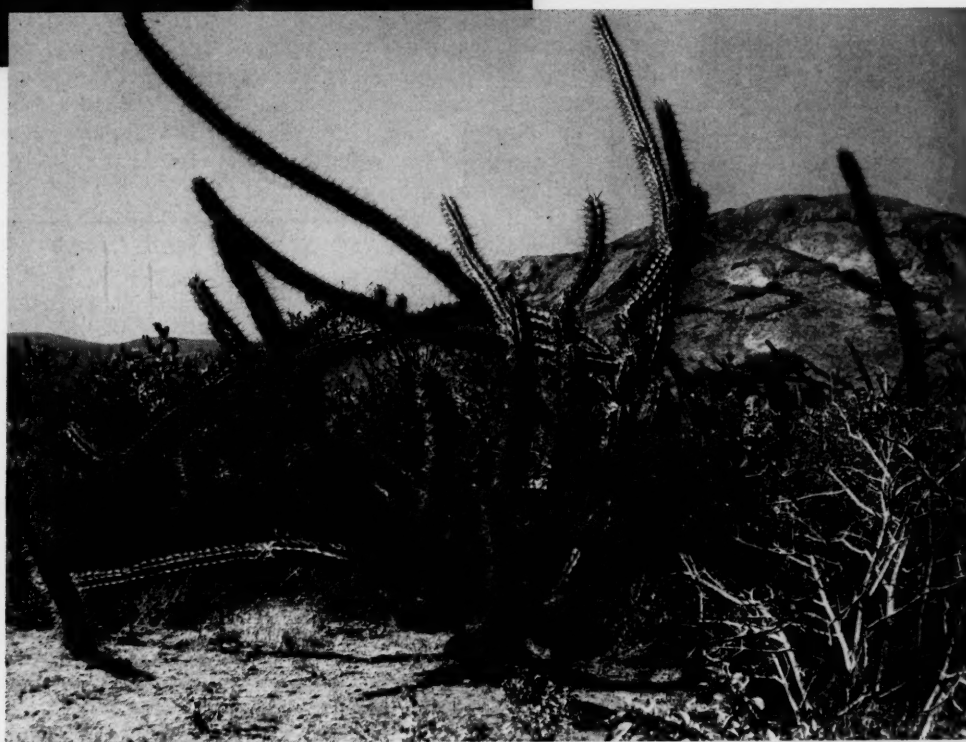
Today, the cacti of the United States are pretty thoroughly known. Dr. George Engelmann, of the Missouri Botanical Garden, was a pioneer in their study, describing many new species from the old "Wild West." Others whose names are familiar have contributed much to our knowledge of the family—Bigelow, Coulter, Britton and Rose—the latter, authors of a four-volume monograph, *The Cactaceæ*. There are others, too—famous botanists who did a careful, thorough job. No, there isn't





This night-flowering variety (*Echinocereus salm-dyckianus noctiflorus*) of Mexico was recently described by the author. Most members of the genus are day-flowering.

ABOVE: Bigelow's or silver cholla of the California Desert is one of the most ill-tempered cacti. The new growth of spines is a lovely silver green, but they blacken with age and make the plant ugly.



The dagger cactus (*Machaerocereus*) of Baja California is characteristically low growing. One of the two species is called the creeping devil. When bruised and thrown into a stream, the stems poison fish—a fact useful to Baja California Indians, when they can find a stream with fish!

much of importance left to do in the way of naming new species in this country. But there is still plenty of interesting work for the desert explorer. Records of distribution are very incomplete for many species. There's a lot of territory to be worked in this country alone. True Cactus Land extends from Texas to California and from Utah, Colorado and Oklahoma south into Mexico. There are hundreds of obscure desert canyons and mesas that probably harbor colonies of cacti—all potential new records of distribution. If you wish to go farther afield, try the mountains of Baja California, the vast desert of eastern Sonora and Chihuahua, or the virtually unknown Sierra de Nayarit.

Almost anywhere you go in the Southwest, you'll find cacti thriving in the inclemency of their desert environment. Contrary to popular notion, the roots of these plants do not penetrate to great depths in search of water. Rather, each plant is surrounded by a circular network of roots, only a few inches below the surface. Here they are ever ready to take advantage of the scantiest rainfall. The only cacti that have really deep roots are the big fellows—the saguaros, organ pipes, and such. They send down a thick root or two for anchorage—to hold the massive stem upright against the strong desert winds. But even here, their true feeding roots are close to the surface.

Once water is brought to the stem, it is held in reserve by the tough, impervious outer skin. During the rains, the plant is fat and almost smoothly cylindrical or globose. But during the dry season, the water is gradually given up and the longitudinal creases deepen into sharp grooves—much like the action of an accordion. When turgid, cacti are very susceptible to rot and to freezing. Those hardy *Echinocerei* that live in the higher mountains have developed a natural desiccating process that starts in the early autumn. When the first winter snow begins to fall, these plants are shriveled, wrinkled things that look more dead than dormant. But with the warmth of spring, they regain their normal succulence, and by late May they are putting on a dazzling display of flowers.

One of the most perfectly adapted desert plants is the "Queen of the Night"—*Peniocereus greggi*. Its rootstock is a large, turnip-like affair, often weighing well over 100 pounds. Its water holding ability can scarcely be doubted! The stems, however, are thin, vine-like branches, grayish-green and looking to a friendly sage-brush for support. So closely do the stems of this cactus resemble the

dry twigs of the sage, that I have often had difficulty in discerning them from even a few feet away. I wonder how many *Peniocerei* I have unwittingly passed by! The camouflage is nearly perfect until the warm nights of June. Then the Queen of the Night puts forth enormous flowers, so white that they seem luminous in the moonlight and their fragrance fills the air for fifty feet and more around. Thus are attracted the nocturnal insects, necessary to pollination and the production of seed. Soon the flowers are gone and *Peniocereus* again lapses into obscurity while the fruit swells. After a time, the desert birds see a large, four-inch fruit of brilliant carmine and unquestionable succulence, apparently growing from sage-brush. In fact, the strong color of the fruit makes it easily visible for many yards on the gray-green desert. Can plants have cleverness? *Peniocereus* seems to have. Its seeds are said to germinate only with great difficulty *unless they have been subjected to the digestive juices of a bird*. So the desert birds enjoy their feast on the rich sweet fruit, then fly away to disperse the seeds beneath some favorite perch—sage-brush or mesquite tree. And beneath the tree the seedlings sprout, protected in their tender youth by the half-shade and assured later of support to grow and reach maturity and start the cycle over again.

Every step of the way, *Peniocereus* has taken advantage of its desert environment, to live and grow and reproduce. Probably other cacti live equally interesting lives; there is much yet to be learned about them. Yes, there is still much work for the desert explorer in this fantastic family of plants.

END

#### SOME BOOKS ABOUT CACTI (all illustrated)

BRITTON, N. L. and J. N. ROSE. *The Cactaceae*. The Carnegie Institution, Washington. 1919-23. (Technical monograph.)

*Cactus and Succulent Journal of America*. The Cactus and Succulent Society, 6162 N. Figueroa St., Los Angeles. Monthly. (Popular.)

HIGGINS, ETHEL BAILEY. *Our Native Cacti*. A. T. DeLaMare Company, New York. 1931. (Popular.)

MARSHALL, W. TAYLOR and THOR METHVEN BOCK. *Cactaceae*. Abbey Garden Press, Pasadena. 1941. (Technical supplement to Britton and Rose.)

SHREVE, FORREST. *The Cactus and its Home*. The Williams & Wilkins Company, Baltimore. 1931. (Popular.)

VAN LAREN, A. J. *Cactus*. Abbey San Encino Press, Los Angeles. 1935. (Popular.)



*Wedge-shaped section of redwood—the split revealed a 1,000-year-old cache of acorns!*

**Robert Cunningham Miller**

## OLDEST BIRD NEST?

ONE DAY IN 1942 MR. THOMAS WITHERELL was cutting wood on the ranch of Mr. J. W. Mailliard, Jr., near Yorkville, twenty miles northwest of Cloverdale, in Mendocino County, California, when he was surprised to discover in an otherwise sound chunk of redwood a cavity containing half a dozen acorns. Mr. Witherell was sufficiently impressed

with the interest of his find to take careful note of the attendant circumstances.

The chunk of wood with the cavity containing the acorns came from a coast redwood tree, six to eight feet in diameter at the base, and three to four feet in diameter at the point where the cavity was found, which was sixty feet above the ground as

## BLACK AND WHITE: *From the Cape to the Congo.*

By Martin Flavin. Harper & Brothers, New York. 1949. 332 pp., line drawings, end-paper map. \$4.00.

In this unpretentious volume, a novelist and playwright has recorded his impressions on a journey through the Union of South Africa, Bechuanaland, and the Belgian Congo. Not straining to be authoritative or "scientific," this informal collection of incidents, conversations, and casual observations results in an interesting picture of the native population and its relation to the governing powers.

Natives fare very differently in the two major countries the author deals with. There is an uncrossable color line in the Union, oppressive, destructive to spirit, which extends far into Bechuanaland, a Crown protectorate, where Mr. Flavin was a guest of Tsekhedi Khama. He gives a sympathetic portrait of this ex-regent (acting ruler at the time of Mr. Flavin's visit). Crossing into the Congo, he suggests sudden changes. There are native customs officials (minor, at any rate), a fact unthinkable in the Union. This superficial change, which also struck this reviewer while crossing from northeastern Angola into the Belgian Congo at Dilolo, foreshadows progress in the attitudes of governments toward their subjects. True, the Belgian Congo, also, has a color line, Mr. Flavin observes, but this color line is based on wealth, on

social rather than biological superiority as asserted by the Anglo-Saxons. But in the Congo there is, nevertheless, a definite plan which works in many ways to the benefit of the natives. It is a changeable and flexible plan, quite adaptable to situations; within its scope, native welfare is taken into account. There are certain limitations imposed upon European industrial and commercial enterprises and there are expanding medical dispensaries, clinics, primary schools, improving housing and diet, and an attempt to create new needs among the natives. But advanced education is apparently discouraged, at least passively. There are no such schools as Achimota College on the Gold Coast, or University College in Ibadan, Nigeria, which this reviewer had the pleasure of visiting not so long ago. Nor are they encouraged to study in the "home country," as the natives of British West African colonies are, for example. For this, one might suspect, would bring them into contact with ideas which run counter to those of the rulers and might upset "The Plan." Mr. Flavin also observes the attitude of average Europeans toward the blacks whom they regard as children, fearing to give them any responsibility of their own. This might arouse a query in the reader: "Isn't this fear of giving the native responsibility for a job also responsible for his failure to carry it once faced with it?" But still, treatment of natives in the

the tree stood. Mr. Witherell counted 1,080 rings between the cavity and the outer edge of the tree. He then reported the matter to Mr. Mailliard, who brought the specimen to the California Academy of Sciences.

The hole was clearly made by a woodpecker, of species undetermined. From its size one would judge it to be the hole of a downy woodpecker, but it might be one that a larger woodpecker had started and left unfinished. Woodpeckers often begin holes they never finish or use. There is no positive evidence that this cavity was ever used as a nest—no feathers nor nestling down—but at least it was intended for a nest. Then the redwood tree, healing its wound, grew over the cavity and enclosed it more than a thousand years ago.

How did the acorns get there? Downy woodpeckers don't store acorns. Gray squirrels might; there are a few in this neighborhood. But Mr. John Thomas Howell, the Academy's Curator of Botany, reports that the acorns represent three different species of oak, the tan oak, the canyon oak, and the coast live oak; it seems improbable that a squirrel would garner acorns over a large enough

area to include all three of these species. The most likely suspect is the California woodpecker.

California woodpeckers store acorns in holes in trees, usually small holes they drill for the purpose. But they will also put acorns in natural holes of about the right size. There are records of their having dropped acorns almost indefinitely into the wall of a house through a knothole in the siding. It appears that the hole under consideration here had gradually closed over until only a small aperture remained; then a California woodpecker started poking acorns into it, continuing until the cavity was filled.

The evidence indicates that these acorns were placed in this tree in or about the year 862 A. D. It gives us a certain perspective on human affairs to consider that, before the Battle of Hastings, before the reign of Alfred the Great, six hundred years before America was "discovered," California woodpeckers were gathering acorns even as today and putting them in little holes—in this case to be discovered only after more than a thousand years. The face of nature has changed little in a millennium, save as man has changed it.

END



Congo is infinitely superior to what it is in the Union of South Africa. Only occasionally there creeps into the pages of this book a distant echo of abuses. But we should remember that barely twenty years have passed since André Gide wrote *Voyage du Congo*.

Perhaps better than anything else Mr. Flavin recaptures psychological reactions of peoples, especially individuals—the sullenness of the urban native and the capacity for enjoyment of the more remote and isolated villager, the apathy of the colonial European or the incertitude of the mulatto who belongs neither here nor there. Mr. Flavin poses no answers nor ready-made recipes for the improvement of the irreversible process of civilization (perhaps we should say “Westernization,” rather) of the black African. But between the lines, without actually having seen these questions set in print, the reader might wonder: Are the economic improvement and expediency, the expansion of medical and educational services, of diet and housing, the imposition of Christian doctrine and many of the amenities of Western civilization — are these really answers to all needs of the natives? Aren’t there somewhere, equally important, psychological satisfactions which European notions of wealth, power, and prestige fail to give?

Mr. Flavin’s beautiful writing and sensitive descriptions of scenery, so well fitting into the mood of the people, are aptly supplemented by fine ink drawings, typography, and printing. Indeed, the form in which this book has been published adds greatly to the pleasure of reading it.

BORYS MALKIN

University of Washington  
Seattle

**THE SANDHILL CRANES.** By Lawrence H. Walkinshaw. Bulletin No. 29, Cranbrook Institute of Science, Bloomfield Hills, Michigan. x + 202 pp., frontispiece in color, 17 half-tone plates, 31 tables, 5 maps. \$3.50.

To quote the author “. . . three words, isolation, remoteness, and solitude are well associated with crane nesting areas in America.” Bearing this in mind one can understand why Mr. Walkinshaw, in the course of his fifteen years of study on *Grus canadensis*, spent 3,507 hours in the field, covered 68,804 miles by riding and 1,921 miles on foot. That such an amazing expenditure of time and effort, if made on many other avian species, might have resulted in a more voluminous report is no discredit to the author. His subject was difficult and his results hard-earned.

The four subspecies of sandhill cranes which include the Lesser Sandhill of Arctic North America and eastern Asia, the Greater Sandhill of southern Canada and northern United States, the Florida Sandhill of southeastern United States and the Cuban Sandhill

of Cuba and the Isle of Pines are each considered from the standpoint of its natural history. Although the author personally made field observations on the habits and behavior of each of these races the majority of the field studies were made on the Greater Sandhill Crane in Michigan. A great deal of valuable information relating to growth and development, as well as behavior, was obtained from a sandhill crane that was removed from the nest the day it hatched and kept in captivity for two and one-half years.

Some interesting observations are presented on the dancing of cranes. Not only do the adults dance at all seasons of the year but the young may engage in such activities when they are but a few days old.

Consideration is given to various factors relating to the ultimate survival of the sandhill crane. Favoring its survival are its love of remote places, extreme wariness and longevity. Opposing these are natural predation, human predation, disease and, of utmost importance, a constant reduction of available breeding habitat. As is true of many other wide-ranging species of animals the more northern populations, occupying wilderness areas, are in much less danger than those occurring farther south where human activities are more concentrated.

The author has searched the literature carefully

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## FROM THE READER

### Return to Thunder River, Once More

EDITOR, *Pacific Discovery*  
SIR:

I have just read Mr. Ferry's article on Thunder River in your March-April issue and feel it cannot go without comment. I have been to Thunder River myself, in late August 1949, and have photographed it in color. Laurie Seaman, of Sydney, Australia, and I went in together on foot, without a guide, and had no difficulty in finding the beginning of the trail at Little Saddle, although it was still unmarked.

As to the source of Thunder River, Mr. Ferry's description of it is in the main correct, but I am convinced that the fall that Ranger Laws and Hade Church spoke of is not the one at the head of Thunder Creek but a 500-foot fall that *does* exist at times at the head of Thunder River. Laurie and I have seen and photographed the gigantic notch cut by water in the top of the wall of the great amphitheater which cradles the river's source and also the deep gorge cut in the bedrock where the water lands, at least 500 feet directly below the notch.

I have spoken to Jonreed Lauritzen about this "mystery" and feel that he has been grossly misquoted by Mr. Ferry. He has never said that there is no fall but only that there was none there when *he* was there. In an article in the April 1950 issue of *Arizona Highways* Mr. Lauritzen says that the Thunder Creek falls has been known of for 50 years. And if Mr. Ferry will refer to the 1941 article that he mentioned he will see that Mr. Lauritzen believes that the fall does exist, as the source of Thunder River, at certain times in the spring when the Kaibab snows are melting and the underground channels are full.

(Mr. Lauritzen has also stated that it is impossible to travel down to the Colorado *along Thunder River* at any time of the year, but that it is necessary to skirt high on the slopes above Thunder in order to reach the confluence. According to Edwin Corle, Jonreed Lauritzen is the only man known to have traveled the full length of Thunder River, although six of us have now reached the source.

CHARLES P. ("CHUCK") VALENTINE

16 Oak Lane, Glen Cove, New York, 2 May 1950.

EDITOR, *Pacific Discovery*  
SIR:

Mr. Valentine states in paragraph 2 that *he is convinced* that the 500-foot waterfall referred to by Ranger Laws and Hade Church is one which may exist intermittently at the head of Thunder River. Since Laws and Church are no longer among the living, we cannot obtain their personal confirmation of this assumption. I can only repeat a state-

ment I made in my original story which appeared in *Natural History* magazine for June 1949, to the effect that we found Ranger Laws' signature cut into a sandstone boulder at the head of the trail leading down to Thunder Creek, and not near Thunder River. The inference here is quite clear. Since neither Mr. Valentine nor anybody else has ever gone on record as stating that they have *actually seen* a waterfall at the spot he describes, Mr. Valentine's assumption is mere guesswork—of which there has already been too much in connection with Thunder River.

Mr. Valentine states in paragraph 3 that I have grossly misquoted Mr. Lauritzen. It is not my policy to misstate the facts. I may have *misinterpreted* Mr. Lauritzen's rather vague remarks but this was unintentional. In corroboration of my claim that Mr. Lauritzen has never admitted the existence of a waterfall anywhere in Thunder River Canyon, I can cite no better authority than Mr. Lauritzen himself. In his story, "Thunder River, An Adventure in the Canyon," which appeared in *Arizona Highways* for June 1941, Mr. Lauritzen wrote: "A short way down and you come to Thunder Creek . . . leaping out of a hole in the base of a thousand-foot wall."

Note that there is no mention here of a waterfall. Rather, the words "base of a thousand-foot wall" imply that the water issues at ground level and flows down the canyon.

So much for Thunder Creek. As for Thunder River, again I quote Mr. Lauritzen:

"Maybe you will have been told, as I was, that Thunder River comes pouring out of the side of the canyon and falls a hundred and fifty feet or so . . . Not many—perhaps two or three—have actually gone along the river to its source to see where it came out. I am one who followed the river all the way. Paul Kernodle of Kansas City is another. We can testify that there is no such fall as the others describe. Thunder River springs mildly from among the rocks at the bottom of the canyon a half mile or less from the canyon's head. The only explanation so far given for this 'Now-you-see-it-now-you-don't' fall is that it may possibly dry up after a long season of drought."

In this paragraph Mr. Lauritzen distinctly denies the existence of a waterfall—in the very area where Mr. Valentine assumes there should be a 500-foot fall. His description of the spring as issuing *from the ground*, precludes any possibility of a fall existing. His concluding qualifying remark that the stream "may possibly dry up after a long season of drought," is a sop and an afterthought inserted in deference to the statements of men like Ranger Laws and Hade Church that a waterfall does exist in Thunder River Canyon. Paragraph 4 (I have not quoted Mr. Lauritzen in this particular instance).

PHILIP FERRY

San Francisco, 7 June 1950.

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and, as a result, there is an extensive bibliography at the end of the text. A key to the cranes of the world is included, also a detailed list of distributional records, arranged in seasonal order, of the four races of sandhill cranes. The book is nicely designed and up to the

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ROBERT T. ORR

Department of Ornithology and Mammalogy  
California Academy of Sciences

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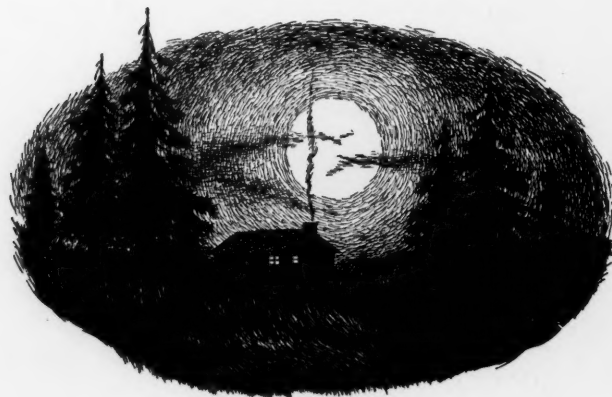
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"And the night shall be filled with music...  
And the cares that infest the day  
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And as silently steal away."

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